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Specimen of a Literal Table for Binary Quantics, otherwise a Partition Table.

BY PROFESSOR CAYLEY.

The Table, commencing 1; b; c, b^2; d, bc, b^3; . . ., is in fact a Partition Table, viz. considering the letters b, c, d, . . . as denoting 1, 2, 3, . . . respectively, it is 1^0; 1; 2, 11; 3, 12, 111; . . . a table of the partitions of the numbers 0, 1, 2, 3 . . ., expressed however in the literal form, in order to its giving the literal terms which enter into the coefficients of any covariant of a binary quantic. The table ought to have been made and published many years ago, before the calculation of the covariants of the quintic; and the present publication of it is, in some measure, an anachronism: but I in fact felt the need of it in some calculations in regard to the sextic; and I think the table may be found useful on other occasions. I have contented myself with calculating the table up to $s = 18$, that is, so as to include in it all the partitions of 18: it would, I think, be desirable to extend it further, say to $z = 26$; or even beyond this point, but perhaps without introducing any new letters, (that is, so as to give for the higher numbers only the partitions with a largest part not exceeding 26): the question of the space which such a table would occupy will be considered presently.

As to the employment of the table, observe that in applying it to the case of a quantic $(a, b, c, d \between x, y)^3$, the terms containing the letters e, f, etc., posterior to the last coefficient d of the quantic are to be disregarded; and that the terms are to be rendered homogeneous by the introduction of the proper power of the first coefficient a, rejecting any term for which the exponent of a would be negative (or what is the same thing, any term of too high a degree in the coefficients b, c, d); thus, for the cubicovariant, where the coefficients are of the degree 3, and of the weights 3, 4, 5, 6 respectively, from the portion of the table

d	e	f	g
bc	bd	be	bf
b^3	c^2	cd	ce
	b^2c	b^2d	d^2
	b^4	bc^2	b^2e
		b^3c	bcd
		b^5	c^3
			b^3d
			etc.

we at once copy out the terms

a^2d	abd	acd	ad^2
abc	ac^2	b^2d	bcd
b^3	b^2c	bc^2	c^3

which compose the coefficients in question.

As regards the formation of the table, this is at once effected, and the successive terms are obtained *currente calamo*, by Arbogast's rule of the last and the last but one: observing that each term is to be regarded as containing implicitly a power of a, so that operating on any term such as b^4, the operation on the last letter gives b^3c, and that on the last but one letter gives b^5. There is little risk of error except in the accidental omission of a term; but of course any one omission would occasion the omission of all the subsequent terms derivable from the omitted term, and would so be fatal: to remove this source of error, observe that for the successive numbers 0, 1, 2, 3, etc., the number of partitions should be

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ...
1	1	2	3	5	7	11	15	22	30	42	56	77	101	135	176	231	297	385 ...

and we can thus, for each partible number successively, verify that the right number of partitions has been obtained.

But as the number of partitions becomes large, a further control is convenient, and even necessary—say we have the 176 partitions of 15, we have by the rule to derive thence the 231 partitions of 16, and it is not until the whole of this derivation is gone through, that we could by counting the number of the new terms ascertain that the right number of 231 terms has been obtained. To break up the verification, it is convenient to know that for the partitions of 16 into 1 part, 2 parts, 3 parts, 4 parts, etc., the numbers of partitions are 1, 8, 21, 34, etc., respectively: we can then as soon as the derivations giving the partitions into 1 part, 2 parts, 3 parts, etc., respectively, have been performed, verify that the right numbers 1, 8, 21, 34, etc., of terms have been obtained. The numbers are contained in the following table, each column of which is calculated from the preceding columns according to a rule which is easily obtained, and which is itself verified by the condition that the sums of the numbers in the several columns give the before mentioned series of numbers 1, 1, 2, 3, 5, 7, etc.

No. of Parts.	PARTIBLE NUMBER.																		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2			1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9
3				1	1	2	3	4	5	7	8	10	12	14	16	19	21	24	27
4					1	1	2	3	5	6	9	11	15	18	23	27	34	39	47
5						1	1	2	3	5	7	10	13	18	23	30	37	47	57
6							1	1	2	3	5	7	11	14	20	26	35	44	58
7								1	1	2	3	5	7	11	15	21	28	38	49
8									1	1	2	3	5	7	11	15	22	29	40
9										1	1	2	3	5	7	11	15	22	30
10											1	1	2	3	5	7	11	15	22
11												1	1	2	3	5	7	11	15
12													1	1	2	3	5	7	11
13														1	1	2	3	5	7
14															1	1	2	3	5
15																1	1	2	3
16																	1	1	2
17																		1	1
18																			1
	1	1	2	3	5	7	11	15	22	30	42	56	77	101	135	176	231	297	385

The practical rule for the construction of the table thus is:— On a sheet of paper ruled in squares, and which is read as a continuous column from the bottom of one column to the top of the next column, form the terms by Arbogast's method as already explained; writing down in pencil a batch of terms, and counting them to see that the right number has been obtained, then, at the same time verifying the derivations, mark these over in ink; and so on with another batch of terms, until the whole number of the partitions of any particular number is obtained.

The foregoing series 1, 1, 2, 3, . . . 385, for the number of the partitions of the successive numbers 0, 1, 2, 3 . . . 18 is carried by Euler up to the number of partitions of 59, = 831820, see the paper *De Partitione Numerorum*, Op. Arith. Coll. I., bottom line of the table pp. 97–101: the continuation from the number 385 and for the partible numbers 19 to 30 is as follows:

19	20	21	22	23	24	25	26	27	28	29	30
490	627	792	1002	1255	1575	1958	2436	3010	3718	4565	5604;

the whole number of terms 1, 1, . . . 5604 amounts to 28629, which at the rate of 500 to a page would occupy somewhat under 60 pages; or, at the rate here employed of 369 to a page, somewhat under 78 pages.

THE PARTITION TABLE, 0 TO 18.

0 · 3	4 · 5	6 · 7	7 · 8	8 · 9	9	9 · 10	10	10 . 11
$\boxed{\begin{matrix}\mathbf{0}\\1\end{matrix}}$ 1 $\boxed{\begin{matrix}\mathbf{1}\\1\end{matrix}}$ b $\boxed{\begin{matrix}\mathbf{2}\\2\end{matrix}}$ c b^2 $\boxed{\begin{matrix}\mathbf{3}\\3\end{matrix}}$ d bc b^3	$\boxed{\begin{matrix}\mathbf{4}\\5\end{matrix}}$ e bd c^2 b^2c b^4 $\boxed{\begin{matrix}\mathbf{5}\\7\end{matrix}}$ f be cd b^2d bc^2 b^3c b^5	$\boxed{\begin{matrix}\mathbf{6}\\11\end{matrix}}$ g bf ce d^2 b^2e bcd c^3 b^3d b^2c^2 b^4c b^6 $\boxed{\begin{matrix}\mathbf{7}\\15\end{matrix}}$ h bg	cf de b^2f bce bd^2 c^2d b^3e b^2cd bc^3 b^4d b^3c^2 b^5c b^7 $\boxed{\begin{matrix}\mathbf{8}\\22\end{matrix}}$ i bh cg df e^2	b^2g bcf bde c^2e cd^2 b^3f b^2ce b^2d^2 bc^2d c^4 b^4e b^3cd b^2c^3 b^5d b^4c^2 b^6c b^8 $\boxed{\begin{matrix}\mathbf{9}\\30\end{matrix}}$ j	bi ch dg ef b^2h bcg bdf be^2 c^2f cde d^3 b^3g b^2cf b^2de bc^2e bcd^2 c^3d b^4f b^3ce b^3d^2 b^2c^2d	bc^4 b^5e b^4cd b^3c^3 b^6d b^5c^2 b^7c b^9 $\boxed{\begin{matrix}\mathbf{10}\\42\end{matrix}}$ k bj ci dh eg f^2 b^2i bch	bdg bef c^2g cdf ce^2 d^2e b^3h b^2cg b^2df b^2e^2 bc^2f $bcde$ bd^3 c^3e c^2d^2 b^4g b^3cf b^3de b^2c^2e b^2cd^2 bc^3d	c^5 b^5f b^4ce b^4d^2 b^3c^2d b^2c^4 b^6e b^5cd b^4c^3 b^7d b^6c^2 b^8c b^{10} $\boxed{\begin{matrix}\mathbf{11}\\56\end{matrix}}$ l bk cj

11	11 . 12	12	12 . 13	13.	13 . 14	14	14	14
di	b^6f	$bcef$	b^6d^2	$bceg$	bc^3d^2	gi	b^4k	c^5e
eh	b^5ce	bd^2f	b^5c^2d	bcf^2	c^5d	h^2	b^3cj	c^4d^2
fg	b^5d^2	bde^2	b^4c^4	bd^2g	b^6h	b^2m	b^3di	b^6i
b^2j	b^4c^2d	c^3g	b^8e	$bdef$	b^5cg	bcl	b^3eh	b^5ch
bci	b^3c^4	c^2df	b^7cd	be^3	b^5df	bdk	b^3fg	b^5dg
bdh	b^7e	c^2e^2	b^6c^3	c^3h	b^5e^2	bej	b^2c^2i	b^5ef
beg	b^6cd	cd^2e	b^9d	c^2dg	b^4c^2f	bfi	b^2cdh	b^4c^2g
bf^2	b^5c^3	d^4	b^8c^2	c^2ef	b^4cde	bgh	b^2ceg	b^4cdf
c^2h	b^8d	b^4i	$b^{10}c$	cd^2f	b^4d^3	c^2k	b^2cf^2	b^4ce^2
cdg	b^7c^2	b^3ch	b^{12}	cde^2	b^3c^3e	cdj	b^2d^2g	b^4d^2e
cef	b^9c	b^3dg		d^3e	$b^3c^2d^2$	cei	b^2def	b^3c^3f
d^2f	b^{11}	b^3ef	**13** 101	b^4j	b^2c^4d	cfh	b^2e^3	b^3c^2de
de^2		b^2c^2g		b^3ci	bc^6	cg^2	bc^3h	b^3cd^3
b^3i	**12** 77	b^2cdf	n	b^3dh	b^7g	d^2i	bc^2dg	b^2c^4e
b^2ch		b^2ce^2	bm	b^3eg	b^6cf	deh	bc^2ef	$b^2c^3d^2$
b^2dg	m	b^2d^2e	cl	b^3f^2	b^6de	dfg	bcd^2f	bc^5d
b^2ef	bl	bc^3f	dk	b^2c^2h	b^5c^2e	e^2g	$bcde^2$	c^7
bc^2g	ck	bc^2de	ej	b^2cdg	b^5cd^2	ef^2	bd^3e	b^7h
$bcdf$	dj	bcd^3	fi	b^2cef	b^4c^3d	b^3l	c^4g	b^6cg
bce^2	ei	c^4e	gh	b^2d^2f	b^3c^5	b^2ck	c^3df	b^6df
bd^2e	fh	c^3d^2	b^2l	b^2de^2	b^8f	b^2dj	c^3e^2	b^6e^2
c^3f	g^2	b^5h	bck	bc^3g	b^7ce	b^2ei	c^2d^2e	b^5c^2f
c^2de	b^2k	b^4cg	bdj	bc^2df	b^7d^2	b^2fh	cd^4	b^5cde
cd^3	bcj	b^4df	bei	bc^2e^2	b^6c^2d	b^2g^2	b^5j	b^5d^3
b^4h	bdi	b^4e^2	bfh	bcd^2e	b^5c^4	bc^2j	b^4ci	b^4c^3e
b^3cg	beh	b^3c^2f	bg^2	bd^4	b^9e	$bcdi$	b^4dh	$b^4c^2d^2$
b^3df	bfg	b^3cde	c^2j	c^4f	b^8cd	$bceh$	b^4eg	b^3c^4d
b^3e^2	c^2i	b^3d^3	cdi	c^3de	b^7c^3	$bcfg$	b^4f^2	b^2c^6
b^2c^2f	cdh	$b^2c\ e$	ceh	c^2d^3	$b^{10}d$	bd^2h	b^3c^2h	b^8g
b^2cde	ceg	$b^2c^2d^2$	cfg	b^5i	b^9c^2	$bdeg$	b^3cdg	b^7cf
b^2d^3	cf^2	bc^4d	d^2h	b^4ch	$b^{11}c$	bdf^2	b^3cef	b^7de
bc^3e	d^2g	c^6	deg	b^4dg	b^{13}	be^2f	b^3d^2f	b^6c^2e
bc^2d^2	def	b^6g	df^2	b^4ef		c^3i	b^3de^2	b^6cd^2
c^4d	e^3	b^5cf	e^2f	b^3c^2g	**14** 135	c^2dh	b^2c^3g	b^5c^3d
b^5g	b^3j	b^5de	b^3k	b^3cdf		c^2eg	b^2c^2df	b^4c^5
b^4cf	b^2ci	b^4c^2e	b^2cj	b^3ce^2	o	c^2f^2	$b^2c^2e^2$	b^9f
b^4de	b^2dh	b^4cd^2	b^2di	b^3d^2e	bn	cd^2g	b^2cd^2e	b^8ce
b^3c^2e	b^2eg	b^3c^3d	b^2eh	b^2c^3f	cm	$cdef$	b^2d^4	b^8d^2
b^3cd^2	b^2f^2	b^2c^5	b^2fg	b^2c^2de	dl	ce^3	bc^4f	b^7c^2d
b^2c^3d	bc^2h	b^7f	bc^2i	b^2cd^3	ek	d^3f	bc^3de	b^6c^4
bc^5	$bcdg$	b^6ce	$bcdh$	bc^4e	fj	d^2e^2	bc^2d^3	$b^{10}e$

14 . 15	15	15	15	15 . 16	16	16	16	16
b^9cd	b^2gh	$bcdef$	b^5f^2	b^4c^4d	cdl	cef^2	cd^2e^2	b^5fg
b^8c^3	bc^2k	bce^3	b^4c^2h	b^3c^6	cek	d^3h	d^4e	b^4c^2i
$b^{11}d$	$bcdj$	bd^3f	b^4cdg	b^9g	cfj	d^2eg	b^5l	b^4cdh
$b^{10}c^2$	$bcei$	bd^2e^2	b^4cef	b^8cf	cgi	d^2f^2	b^4ck	b^4ceg
$b^{12}c$	$bcfh$	c^4h	b^4d^2f	b^8de	ch^2	de^2f	b^4dj	b^4cf^2
b^{14}	bcg^2	c^3dg	b^4de^2	b^7c^2e	d^2k	e^4	b^4ei	b^4d^2g
15 176	bd^2i	c^3ef	b^3c^3g	b^7cd^2	dej	b^4m	b^4fh	b^4def
	$bdeh$	c^2d^2f	b^3c^2df	b^6c^3d	dfi	b^3cl	b^4g^2	b^4e^3
	$bdfg$	c^2de^2	$b^3c^2e^2$	b^5c^5	dgh	b^3dk	b^3c^2j	b^3c^3h
p	be^2g	cd^3e	b^3cd^2e	$b^{10}f$	e^2i	b^3ej	b^3cdi	b^3c^2dg
bo	bef^2	d^5	b^3d^4	b^9ce	efh	b^3fi	b^3ceh	b^3c^2ef
cn	c^3j	b^5k	b^2c^4f	b^9d^2	eg^2	b^3gh	b^3cfg	b^3cd^2f
dm	c^2di	b^4cj	b^2c^3de	b_8c^2d	f^2g	b^2c^2k	b^3d^2h	b^3cde^2
el	c^2eh	b^4di	$b^2c^2d^3$	b^7c^4	b^3n	b^2cdj	b^3deg	b^3d^3e
fk	c^2fg	b^4eh	bc^5e	$b^{11}e$	b^2cm	b^2cei	b^3df^2	b^2c^4g
gj	cd^2h	b^4fg	bc^4d^2	$b^{10}cd$	b^2dl	b^2cfh	b^3e^2f	b^2c^3df
hi	$cdeg$	b^3c^2i	c^6d	b^9c^3	b^2ek	b^2cg^2	b^2c^3i	$b^2c^3e^2$
b^2n	cdf^2	b^3cdh	b^7i	$b^{12}d$	b^2fj	b^2d^2i	b^2c^2dh	$b^2c^2d^2e$
bcm	ce^2f	b^3ceg	b^6ch	$b^{11}c^2$	b^2gi	b^2deh	b^2c^2eg	b^2cd^4
bdl	d^3g	b^3cf^2	b^6dg	$b^{13}c$	b^2h^2	b^2dfg	$b^2c^2f^2$	bc^5f
bek	d^2ef	b^3d^2g	b^6ef	b^{15}	bc^2l	b^2e^2g	b^2cd^2g	bc^4de
bfj	de^3	b^3def	b^5c^2g	**16** 231	$bcdk$	b^2ef^2	b^2cdef	bc^3d^3
bgi	b^4l	b^3e^3	b^5cdf		$bcej$	bc^3j	b^2ce^3	c^6e
bh^2	b^3ck	b^2c^3h	b^5ce^2		$bcfi$	bc^2di	b^2d^3f	c^5d^2
c^2l	b^3dj	b^2c^2dg	b^5d^2e	q	$bcgh$	bc^2eh	$b^2d^2e^2$	b^7j
cdk	b^3ei	b^2c^2ef	b^4c^3f	bp	bd^2j	bc^2fg	bc^4h	b^6ci
cej	b^3fh	b^2cd^2f	b^4c^2de	co	$bdei$	bcd^2h	bc^3dg	b^6dh
cfi	b^3g^2	b^2cde^2	b^4cd^3	dn	$bdfh$	$bcdeg$	bc^3ef	b^6eg
cgh	b^2c^2j	b^2d^3e	b^3c^4e	em	bdg^2	$bcdf^2$	bc^2d^2f	b^6f^2
d^2j	b^2cdi	bc^4g	$b^3c^3d^2$	fl	be^2h	bce^2f	bc^2de^2	b^5c^2h
dei	b^2ceh	bc^3df	b^2c^5d	gk	$befg$	bd^3g	bcd^3e	b^5cdg
dfh	b^2cfg	bc^3e^2	bc^7	hj	bf^3	bd^2ef	bd^5	b^5cef
dg^2	b^2d^2h	bc^2d^2e	b^8h	i^2	c^3k	bde^3	c^5g	b^5d^2f
e^2h	b^2deg	bcd^4	b^7cg	b^2o	c^2dj	c^4i	c^4df	b^5de^2
efg	b^2df^2	c^5f	b^7df	bcn	c^2ei	c^3dh	c^4e^2	b^4c^3g
f^3	b^2e^2f	c^4de	b^7e^2	bdm	c^2fh	c^3eg	c^3d^2e	b^4c^2df
b^3m	bc^3i	c^3d^3	b^6c^2f	bel	c^2g^2	c^3f^2	c^2d^4	$b^4c^2e^2$
b^2cl	bc^2dh	b^6j	b^6cde	bfk	cd^2i	c^2d^2g	b^6k	b^4cd^2e
b^2dk	bc^2eg	b^5ci	b^6d^3	bgj	$cdeh$	c^2def	b^5cj	b^4d^4
b^2ej	bc^2f^2	b^5dh	b^5c^3e	bhi	$cdfg$	c^2e^3	b^5di	b^3c^4f
b^2fi	bcd^2g	b^5eg	$b^5c^2d^2$	c^2m	ce^2g	cd^3f	b^5eh	b^3c^3de

16	16 . 17	17	17	17	17	17	17	17 . 18
$b^3c^2d^3$	b^9c^2d	efi	def^2	c^2deg	bc^2e^3	bc^5g	b^7f^2	$b^7c^2d^2$
b^2c^5e	b^8c^4	egh	e^3f	c^2df^2	bcd^3f	bc^4df	b^6c^2h	b^6c^4d
$b^2c^4d^2$	$b^{12}e$	f^2h	b^4n	c^2e^2f	bcd^2e^2	bc^4e^2	b^6cdg	b^5c^6
bc^6d	$b^{11}cd$	fg^2	b^3cm	cd^3g	bd^4e	bc^3d^2e	b^6cef	$b^{11}g$
c^8	$b^{10}c^3$	b^3o	b^3dl	cd^2ef	c^5h	bc^2d^4	b^6d^2f	$b^{10}cf$
b^8i	$b^{13}d$	b^2cn	b^3ek	cde^3	c^4dg	c^6f	b^6de^2	$b^{10}de$
b^7ch	$b^{12}c^2$	b^2dm	b^3fj	d^4f	c^4ef	c^5de	b^5c^3g	b^9c^2e
b^7dg	$b^{14}c$	b^2el	b^3gi	d^3e^2	c^3d^2f	c^4d^3	b^5c^2df	b^9cd^2
b^7ef	b^{16}	b^2fk	b^3h^2	b^5m	c^3de^2	b^7k	$b^5c^2e^2$	b^8c^3d
b^6c^2g	**17** 297	b^2gj	b^2c^2l	b^4cl	c^2d^3e	b^6cj	b^5cd^2e	b^7c^5
b^6cdf		b^2hi	b^2cdk	b^4dk	cd^5	b^6di	b^5d^4	$b^{12}f$
b^6ce^2		bc^2m	b^2cej	b^4ej	b^6l	b^6eh	b^4c^4f	$b^{11}ce$
b^6d^2e	r	$bcdl$	b^2cfi	b^4fi	b^5ck	b^6fg	b^4c^3de	$b^{11}d^2$
b^5c^3f	bq	$bcek$	b^2cgh	b^4gh	b^5dj	b^5c^2i	$b^4c^2d^3$	$b^{10}c^2d$
b^5c^2de	cp	$bcfj$	b^2d^2j	b^3c^2k	b^5ei	b^5cdh	b^3c^5e	b^9c^4
b^5cd^3	do	$bcgi$	b^2dei	b^3cdj	b^5fh	b^5ceg	$b^3c^4d^2$	$b^{13}e$
b^4c^4e	en	bch^2	b^2dfh	b^3cei	b^5g^2	b^5cf^2	b^2c^6d	$b^{12}cd$
$b^4c^3d^2$	fm	bd^2k	b^2dg^2	b^3cfh	b^4c^2j	b^5d^2g	bc^8	$b^{11}c^3$
b^3c^5d	gl	$bdej$	b^2e^2h	b^3cg^2	b^4cdi	b^5def	b^9i	$b^{14}d$
b^2c^7	hk	$bdfi$	b^2efg	b^3d^2i	b^4ceh	b^5e^3	b^8ch	$b^{13}c^2$
b^9h	ij	$bdgh$	b^2f^3	b^3deh	b^4cfg	b^4c^3h	b^8dg	$b^{15}c$
b^8cg	b^2p	be^2i	bc^3k	b^3dfg	b^4d^2h	b^4c^2dg	b^8ef	b^{17}
b^8df	bco	$befh$	bc^2dj	b^3e^2g	b^4deg	b^4c^2ef	b^7c^2g	**18** 385
b^8e^2	bdn	beg^2	bc^2ei	b^3ef^2	b^4df^2	b^4cd^2f	b^7cdf	
b^7c^2f	bem	bf^2g	bc^2fh	b^2c^3j	b^4e^2f	b^4cde^2	b^7ce^2	
b^7cde	bfl	c^3l	bc^2g^2	b^2c^2di	b^3c^3i	b^4d^3e	b^7d^2e	s
b^7d^3	bgk	c^2dk	bcd^2i	b^2c^2eh	b^3c^2dh	b^3c^4g	b^6c^3f	br
b^6c^3e	bhj	c^2ej	$bcdeh$	b^2c^2fg	b^3c^2eg	b^3c^3df	b^6c^2de	cq
$b^6c^2d^2$	bi^2	c^2fi	$bcdfg$	b^2cd^2h	$b^3c^2f^2$	$b^3c^3e^2$	b^6cd^3	dp
b^5c^4d	c^2n	c^2gh	bce^2g	b^2cdeg	b^3cd^2g	$b^3c^2d^2e$	b^5c^4e	eo
b^4c^6	cdm	cd^2j	$bcef^2$	b^2cdf^2	b^3cdef	b^3cd^4	$b^5c^3d^2$	fn
$b^{10}g$	cel	$cdei$	bd^3h	b^2ce^2f	b^3ce^3	b^2c^5f	b^4c^5d	gm
b^9cf	cfk	$cdfh$	bd^2eg	b^2d^3g	b^3d^3f	b^2c^4de	b^3c^7	hl
b^9de	cgj	cdg^2	bd^2f^2	b^2d^2ef	$b^3d^2e^2$	$b^2c^3d^3$	$b^{10}h$	ik
b^8c^2e	chi	ce^2h	bde^2f	b^2de^3	b^2c^4h	bc^6e	b^9cg	j^2
b^8cd^2	d^2l	$cefg$	be^4	bc^4i	b^2c^3dg	bc^5d^2	b^9df	b^2q
b^7c^3d	dek	cf^3	c^4j	bc^3dh	b^2c^3ef	c^7d	b^9e^2	bcp
b^6c^5	dfj	d^3i	c^3di	bc^3eg	$b^2c^2d^2f$	b^8j	b^8c^2f	bdo
$b^{11}f$	dgi	d^2eh	c^3eh	bc^3f^2	$b^2c^2de^2$	b^7ci	b^8cde	ben
$b^{10}ce$	dh^2	d^2fg	c^3fg	bc^2d^2g	b^2cd^3e	b^7dh	b^8d^3	bfm
$b^{10}d^2$	e^2j	de^2g	c^2d^2h	bc^2def	b^2d^5	b^7eg	b^7c^3e	bgl

18	18	18	18	18	18	18	18	18
bhk	$befi$	b^2dej	d^3ef	bc^2deg	b^3cdf^2	b^4c^3i	b^5cd^2f	b^8c^2g
bij	$begh$	b^2dfi	d^2e^3	bc^2df^2	b^3ce^2f	b^4c^2dh	b^5cde^2	b^8cdf
c^2o	bf^2h	b^2dgh	b^5n	bc^2e^2f	b^3d^3g	b^4c^2eg	b^5d^3e	b^8ce^2
cdn	bfg^2	b^2e^2i	b^4cm	bcd^3g	b^3d^2ef	$b^4c^2f^2$	b^4c^4g	b^8d^2e
cem	c^3m	b^2efh	b^4dl	bcd^2ef	b^3de^3	b^4cd^2g	b^4c^3df	b^7c^3f
cfl	c^2dl	b^2eg^2	b^4ek	$bcde^3$	b^2c^4i	b^4cdef	$b^4c^3e^2$	b^7c^2de
cgk	c^2ek	b^2f^2g	b^4fj	bd^4f	b^2c^3dh	b^4ce^3	$b^4c^2d^2e$	b^7cd^3
chj	c^2fj	bc^3l	b^4gi	bd^3e^2	b^2c^3eg	b^4d^3f	b^4cd^4	b^6c^4e
ci^2	c^2gi	bc^2dk	b^4h^2	c^5i	$b^2c^3f^2$	$b^4d^2e^2$	b^3c^5f	$b^6c^3d^2$
d^2m	c^2h^2	bc^2ej	b^3c^2l	c^4dh	$b^2c^2d^2g$	b^3c^4h	b^3c^4de	b^5c^5d
del	cd^2k	bc^2fi	b^3cdk	c^4eg	b^2c^2def	b^3c^3dg	$b^3c^3d^3$	b^4c^7
dfk	$cdej$	bc^2gh	b^3cej	c^4f^2	$b^2c^2e^3$	b^3c^3ef	b^2c^6e	$b^{11}h$
dgj	$cdfi$	bcd^2j	b^3cfi	c^3d^2g	b^2cd^3f	$b^3c^2d^2f$	$b^2c^5d^2$	$b^{10}cg$
dhi	$cdgh$	$bcdei$	b^3cgh	c^3def	$b^2cd^2e^2$	$b^3c^2de^2$	bc^7d	$b^{10}df$
e^2k	ce^2i	$bcdfh$	b^3d^2j	c^3e^3	b^2d^4e	b^3cd^3e	c^9	$b^{10}e^2$
efj	$cefh$	$bcdg^2$	b^3dei	c^2d^3f	bc^5h	b^3d^5	b^9j	b^9c^2f
egi	ceg^2	bce^2h	b^3dfh	$c^2d^2e^2$	bc^4dg	b^2c^5g	b^8ci	b^9cde
eh^2	cf^2g	$bcefg$	b^3dg^2	cd^4e	bc^4ef	b^2c^4df	b^8dh	b^9d^3
f^2i	d^3j	bcf^3	b^3e^2h	d^6	bc^3d^2f	$b^2c^4e^2$	b^8eg	b^8c^3e
fgh	d^2ei	bd^3i	b^3efg	b^6m	bc^3de^2	$b^2c^3d^2e$	b^8f^2	$b^8c^2d^2$
g^3	d^2fh	bd^2eh	b^3f^3	b^5cl	bc^2d^3e	$b^2c^2d^4$	b^7c^2h	b^7c^4d
b^3p	d^2g^2	bd^2fg	b^2c^3k	b^5dk	bcd^5	bc^6f	b^7cdg	b^6c^6
b^2co	de^2h	bde^2g	b^2c^2dj	b^5ej	c^3g	bc^5de	b^7cef	$b^{12}g$
b^2dn	$defg$	$bdef^2$	b^2c^2ei	b^5fi	c^5df	bc^4d^3	b^7d^2f	$b^{11}cf$
b^2em	df^3	be^3f	b^2c^2fh	b^5gh	c^5e^2	c^7e	b^7de^2	$b^{11}de$
b^2fl	e^3g	c^4k	$b^2c^2g^2$	b^4c^2k	c^4d^2e	c^6d^2	b^6c^3g	$b^{10}c^2e$
b^2gk	e^2f^2	c^3dj	b^2cd^2i	b^4cdj	c^3d^4	b^8k	b^6c^2df	$b^{10}cd^2$
b^2hj	b^4o	c^3ei	b^2cdeh	b^4cei	b^7l	b^7cj	$b^6c^2e^2$	b^9c^3d
b^2i^2	b^3cn	c^3fh	b^2cdfg	b^4cfh	b^6ck	b^7di	b^6cd^2e	b^8c^5
bc^2n	b^3dm	c^3g^2	b^2ce^2g	b^4cg^2	b^6dj	b^7eh	b^6d^4	$b^{13}f$
$bcdm$	b^3el	c^2d^2i	b^2cef^2	b^4d^2i	b^6ei	b^7fg	b^5c^4f	$b^{12}ce$
$bcel$	b^3fk	c^2deh	b^2d^3h	b^4deh	b^6fh	b^6c^2i	b^5c^3de	$b^{12}d^2$
$bcfk$	b^3gj	c^2dfg	b^2d^2eg	b^4dfg	b^6g^2	b^6cdh	$b^5c^2d^3$	$b^{11}c^2d$
$bcgj$	b^3hi	c^2e^2g	$b^2d^2f^2$	b^4e^2g	b^5c^2j	b^6ceg	b^4c^5e	$b^{10}c^4$
$bchi$	b^2c^2m	c^2ef^2	b^2de^2f	b^4ef^2	b^5cdi	b^6cf^2	$b^4c^4d^2$	$b^{14}e$
bd^2l	b^2cdl	cd^3h	b^2e^4	b^3c^3j	b^5ceh	b^6d^2g	b^3c^6d	$b^{13}cd$
$bdek$	b^2cek	cd^2eg	bc^4j	b^3c^2di	b^5cfg	b^6def	b^2c^8	$b^{12}c^3$
$bdfj$	b^2cfj	cd^2f^2	bc^3di	b^3c^2eh	b^5d^2h	b^6e^3	$b^{10}i$	$b^{15}d$
$bdgi$	b^2cgi	cde^2f	bc^3eh	b^3c^2fg	b^5deg	b^5c^3h	b^9ch	$b^{14}c^2$
bdh^2	b^2ch^2	ce^4	bc^3fg	b^3cd^2h	b^5df^2	b^5c^2dg	b^9dg	$b^{16}c$
be^2j	b^2d^2k	d^4g	bc^2d^2h	b^3cdeg	b^5e^2f	b^5c^2ef	b^9ef	b^{18}